



## APPLICATIONS

The BBS-X series of akousto elastic sensors is used to measure variations in compressive stress and load, which allows stress evaluation when the material's modulus of elasticity is unknown or anisotropic and inhomogeneous. Typical examples are concretes and drill holes in the rocks, where these instruments can be used include:

- Mining
- Tunnel supports
- Bridges, pillars, walls
- Dams and nuclear power plants
- Structural members of buildings and bridges
- Piles and caissons
- Under anchor plate by rock bolts and rebars

## DESCRIPTION

The sensor detects the compression of a metal body. This metal body is 2 components resin and protected housing. The housing is arranged in concrete or in the iron braid of reinforcement.

The compression are measured with ultrasonic pulse-echo method. In the case of concrete tension sensor, an ultrasonic sensor is included. The runtime in the measuring element is measured in high resolution with a separate stress meter. All ultrasound devices to the bolt measurement with a maximum frequency of 10 MHz is suitable for the measurement.

The term declines linearly with the compression in the elastic range.

Which the compressive stress sensor surrounding concrete is a compression of the measuring element. The change in the length of the measuring element is not only dependent on the load or stress, but also on the temperature.

Both factors taken into account the ultrasound measuring device for measuring the change in length.

A permanent temperature measurement is integrated into the pressure voltage sensor. This temperature sensor work as 1-wire sensor with ROM for the identification.

For universal use, the sensor for all devices for the measurement of bolt is suitable regardless of the manufacturer. The automatic temperature correction of these devices can be used, a second is incorporated independent temperature sensor.

The term due to the change in length and acousto elastic effect has reduced the influence of the surrounding concrete on the measuring element.

## INSTALLATION AND READING

The sensors are embedded in the concrete. The cable to a junction box. This is accessible. The ultrasonic bolt gauge is connected to the sensor at each measurement via an adapter of RJ45 to LEMO. In development is an electronic unit for permanent monitoring with field bus RS485. The resolution will be better 0.05 ns and 0.010 MPA.



## FEATURES

- Long-term reliability
- Resolution and accuracy is only dependent on the Scantool or ultrasonic boltmeter
- Maximum compressive stress up to 150 MPa
- Ease of installation
- Corrosion resistant: plastic components
- unique identification number in ROM
- Independent temperature measurement 1-wire
- Second Temperature probe for automatic temperature compensation for the ultrasonic boltmeter
- No hydraulics, no oil
- No moving mechanism
- Open sensor system for future advanced electronic systems with higher resolution

## ACCESSORIES

- adaptor (between Sensor and Boltmeter)
- adaptor (Reader ID and temperature,USB)

Not in the order:

- Junction box
- Compatible Readout instruments :

USM-3 Ultrasonic Stress Meter, Norbar Torque Tools  
BoltMike III Ultrasonic Bolt Extensometer, GE Meas. & Control  
BG80TDL Bolt Tension Monitor ,Elcometer Instruments  
Mini-Max Bolt Tension Monitor, Qualitest North America

## ORDERING INFORMATION

Please specify:

- Cable length
- Accessories
- Model

## SPECIFICATIONS

MODEL BBS-15P\_DS

Range 150 MPa max

Resolution with Boltmeter 0.0001 mm (linear unit) ,0.1 ns                      second echo corresponds to 0.2 MPa

Resolution with Boltmeter 0.0001 mm (linear unit) ,0.1 ns                      fifth echo corresponds to 0.08 MPa

Resolution with electronic unit<sup>1</sup> 0.000005 mm (linear unit) ,0.05 ns                      first echo corresponds to 0.01 MPa

Operating temperature -20 to +80°C

First temperature sensor 12 Bit 1-wire (Dallas 18B20)

Second temperature sensor Thermistor or Pt (see model boltmeter)

Electrical cable JR45, CAT6 (length optional)

1) in development

## DIMENSIONS

90 mm (length) x 44 mm (width) x 24 mm (height)